



Insulation Material

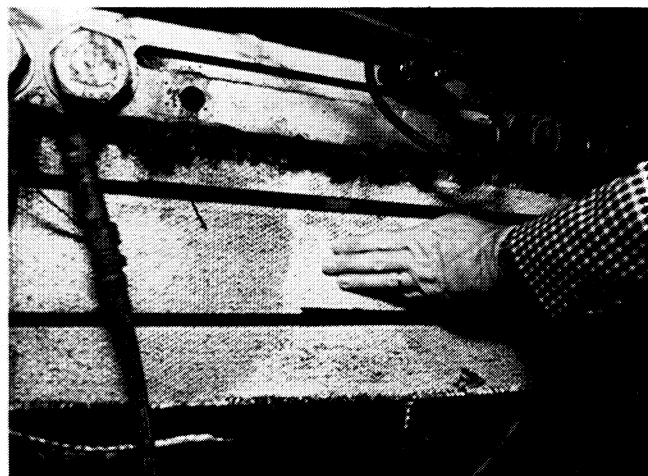
Manufactured by Hitco Materials Division of Armco, Inc., Gardena, California, a ceramic fiber insulation material known as Refrasil™ has been used extensively as a heat-absorbing ablative reinforcement for such space systems as rocket motor nozzles, combustion chambers and re-entry shields. In the Space Shuttle, for example, it is used to cover rocket nozzles and it lines the walls of the main fuel tank to keep temperatures within proper limits. Refrasil fibers are highly porous and do not melt or vaporize until temperatures exceed 3100 degrees Fahrenheit. Due to these and other properties, Refrasil has found utility in a number of industrial high temperature applications where glass, asbestos and other materials fail.

An example is a problem-solving project wherein NASA's Aerospace Research Application Center (ARAC), a component of the Indianapolis (Indiana) Center for Advanced Research, provided assistance to a manufacturer of hard rubber and plastic molded battery cases. Richardson Battery Parts Division of Witco Chemical Corporation, located in Indianapolis, asked ARAC's help on a problem related to heavy steam-heated molds employed in the manufacture of battery cases. Richardson wanted to reduce the heat loss from the sides of the molds to curb the high energy costs of generating steam and to increase worker safety in handling the molds. A Richardson engineer calculated that up to 95 percent of the input heat into the molds was being wasted in radiation to the outside of the molds. Due to clearance restrictions, Richardson needed an insulating material less than one-quarter inch thick to fit around the outside of the molds. The material had to withstand rough treatment during mold block changes and resist exposure to hot water, steam, hydraulic fluids and mold temperatures that average 390 degrees

Fahrenheit. Richardson tried applying conventional materials but found none suitable.

ARAC conducted a search of 11 data bases, identified more than 100 pertinent reports and followed up by discussing the problem with officials at three NASA centers. ARAC's analysis report to Richardson Division listed several materials that seemed to meet company requirements. Richardson studied the options and selected one-eighth thick Refrasil ceramic fiber cloth as best suited.

Some 500—about 80 percent—of the company's molds are now fitted with Refrasil insulation, which is wrapped around the mold and tightened by easily installed and readily removable steel bands. In the upper photo, Robert K. Beacham, Richardson's manager of manufacturing engineering, is examining a Refrasil mold installation with an ARAC engineer; the material is shown in closeup below. Steam usage for molding at Richardson Division has been reduced by 20 percent due to Refrasil application, and the initial cost of installation was paid back in only 35 days. The company now plans to insulate the steam lines leading to the molds with Refrasil cloth.



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